Substituting $\tan\alpha$ for m, we get

$$\frac{\pi}{2}\log\frac{1+\sin\alpha}{1-\sin\alpha}=\frac{\pi}{2}\log\frac{(1+\sin\alpha)^2}{1-\sin^2\alpha}=\frac{\pi}{2}\log\left(\frac{1+\sin\alpha}{\cos\alpha}\right)^2=\pi\log(\tan\alpha+\sec\alpha),$$

which result is quite as great as that given in the proposed problem.

MECHANICS.

188. **Proposed by H. L. ORCHARD, M. A., B. Sc.**

Spherical bubbles are rising in water. Find the relation between radius and velocity.

No solution has been received.

189 (Incorrectly numbered 190). **Proposed by DR. L. E. DICKSON, The University of Chicago, Chicago, Ill.**

Give the axiomatic principle of Physics which is equivalent to the theorem on the compound of two circles ("Graphical Methods in Trigonometry," MONTHLY, June-July, 1905).

No solution has been received.

190 (Incorrectly numbered 191). **Proposed by J. EDWARD SANDERS, Reinersville, Ohio.**

A pole hinged at the bottom leans against the mid-point of a smooth rope suspended from two supports of equal height. Determine the position of equilibrium.

Solution by G. W. GREENWOOD, M. A., Dunbar, Pa.

Assuming that the figure is symmetrical with respect to the plane bisecting perpendicularly the segment determined by the two points of support, the tensions of the portions of the rope resolved parallel to the pole are equal in magnitude and direction, and must therefore be zero since the rope is smooth. Hence, the pole rests in a position perpendicular to the plane determined by the portions of the rope.

191 (Incorrectly numbered 192). **Proposed by REV. J. H. MEYER, S. J., College of Sacred Heart, Augusta, Ga.**

Find the velocity of a planet at a given point in its orbit.

Solution by G. W. GREENWOOD, M. A., Dunbar, Pa.

In the case of any central orbit we have $v=h/p$...(1), where p is the perpendicular from the pole upon the tangent at the point, and h is a constant. Also,

$$\frac{1}{p^2}=u^2+\left(\frac{du}{d\theta}\right)^2$$

and the equation of an ellipse, referred to a focus, is $lu=1+e\cos\theta$, where l is the semi-latus rectum.